

Amendments to the Specification

Please replace the paragraph beginning on page 2 at line 37 with the following amended paragraph:

Traditional cigar shaped blimps may also tend to present other disadvantages when viewed in the context of an aircraft having a high altitude service ceiling. Conventionally, cigar shaped airships employ fore and aft balloonets that can be inflated, or deflated, as the internal gas bags expand or contract with changes in altitude or temperature. Differential inflation of the balloonets can also be used to adjust airship trim. The balloonet operation between sea level (where ambient pressure is about 14.7 psia) and 5000 ft (where ambient pressure is about 12.5 psia) may involve balloonets of roughly 20 % of the internal volume of the aircraft[], to]. To reach a service ceiling of about 60,000 ft (where the ambient pressure is about 1.0 psia), the volume of the lifting gas used at lift-off from sea level may be as little as about 1/18 of the volume of the lifting gas at 60,000 ft. This may present significant control challenges at low altitude for a cigar shaped aircraft. Further, conventional airships tend to rely on airflow over their control surfaces to manoeuvre in flight. However, at high altitude the density of the air is sufficiently low that a much higher velocity may be required to maintain the level of control achieved at lower altitude. Further still, blimps and dirigibles are known to be susceptible to "porpoising". At 60,000 ft there is typically relatively little turbulence, and relatively light winds, or calm. In a light or "no-wind" situation, it may be difficult to maintain a cigar shaped dirigible "on station", i.e., in a set location for which the variation in position is limited to a fixed range of deviation such as a target box 1 km square relative to a ground station. Although 1 km may seem like a large distance, it is comparatively small relative to an airship that may be 300 m in length.

Please replace the paragraph beginning on page 12 at line 15 with the following amended paragraph:

Airship 20 has an auxiliary power unit fuel reservoir 80 located in a lower region thereof. Optionally, fuel reservoir 80 may have a filler line 82 mounted externally to outer envelope 22, and a docking receptacle 84 mounted centrally to the top of outer envelope 22. Filler line 82, receptacle 84, and reservoir 80 are all electrically grounded to the chassis of APU 52. Filler line 82 also has a drain line 86 and three way valve 88. Replenishment of reservoir 80 can be undertaken by flying a tanker airship 90 (Figure 5) of similar spherical shape to a height above



aircraft 20, and maintaining airship 90 in position. An electrically grounded filling nozzle is lowered to engage receptacle 84. When in position, nozzle 92 is energized to clamp to receptacle 84, making a sealed, and electrically grounded, connection. Fuel is then permitted to flow through line 82 to replenish reservoir 80. While this occurs, aircraft 90 may release lifting gas at a rate corresponding to the rate of fuel transfer so as to maintain approximately neutral buoyancy. Similarly, inflation of gas bag 30 of aircraft 20 may be increased at the same rate to maintain approximately neutral buoyancy of aircraft 20. During replenishment three way valve 86 88 is set to permit flow from receptacle 84 to reservoir 80. When reservoir 80 approaches a "full" condition, aircraft 90 is signalled to cease filling. A valve 92 on delivery line 94 is closed, and line 94 is permitted to drain through nozzle 84 92. Line 82 is similarly permitted to drain into reservoir 80. When line 82 has been drained in this way, valve 86 88 is set to permit line 82 to drain through drain line 84 86. Nozzle 84 92 is de-energized, ~~replenishment feed~~ delivery line 94 is retracted, and aircraft 90 returns to base.

Please replace the paragraph beginning on page 13 at line 20 with the following amended paragraph:

The lower region of outer envelope 20 22 houses an equipment blister 120 sewn generally inwardly of the otherwise generally spherical surface of outer envelope 22. Equipment blister 120 houses a control module 122 connected to operate motors 44, 46, 62, 64, 78 and APU 52, hence controlling propulsion and direction of airship 20. In addition control module 122 is operable to control inflation of (a) gas bag 30, (b) bleed of excess lifting gas from gas bag 30, (c) positive pressurisation of outer envelope 22 by blower 26, and pressure relief by valve 28, (d) port, starboard and stern navigational lights 124, 126, 128; (e) the refuelling system described above; and (f) internal lights 130. Control module 122 is connected to a radio aerial array 132 by which control and equipment monitoring signals are sent to a remotely located controlling station, indicated in Figure 5 as 136. Controlling station 136 is preferably a ground station, whether at a fixed installation or in a mobile installation such as a command truck, but could also be a ship-borne controlling station or an airborne controlling station. Control module 122 is also connected to sensors 144, 146 for measuring external ambient temperature and pressure; V-A-Ω Meter, 148 for measuring current and voltage from solar cell array 50; sensors 150, 152 (Figure 1b) for measuring gas bag temperature and pressure; 154, 156 for measuring APU fuel supply in reservoir 80; V-A-Ω Meter 158 for measuring motor current draw; antenna 160 for receiving global positioning system or other telemetry data, 162 for measuring relative air speed; and 164, 166 for measuring stored charge (in the case of battery power) and fuel cell status (in the case of



JUN 7. 2005 2:16PM

NO. 8053 P. 7

use of a fuel cell). Inputs from the various sensors are used to permit (a) the controlling station to be aware of the status of the operating systems of aircraft 20, and (b) control of the operation of airship 20.

Please replace the paragraph beginning on page 15 at line 34 with the following amended paragraph:

The proportion of inflation of gas bay bag 30 at sea level tends to correspond to the service ceiling of the aircraft. That is, partial inflation can be made for the given operational service ceiling, be it 10,000 ft, 18,000 ft, 40,000 ft, 60,000 ft or higher. The volume of sea level inflation may be of the order of 70 % of maximum inflation by volume to achieve a service ceiling of about 10,000 ft, 50 % to achieve a service ceiling of about 18,000 ft, 25 % to achieve a service ceiling of about 35,000 ft; 20 % to achieve a service ceiling of about 40,000 ft, 10 % to achieve a service ceiling of about 50,000 ft; about 7 1/2 % to achieve a service ceiling of 60,000 ft; and about 5 % to achieve a service ceiling of about 70,000 ft. In the preferred embodiment, the aircraft has a service ceiling of about 60,000 ft.

21413903.1